

Systematic Literature Review Application of The Unified Modeling Language (UML) Method in Designing a New Student Admission Information System

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ABSTRACT

In this study, a systematic literature review that focuses on the application of the UML method in designing a New Student Admission Information System. Where in this study raised problems experienced by several schools that still use the old system (manual) in operating activities in schools, one of which is the flow of new student admissions. So that it produces performance that is not effective and efficient and has an unfavourable impact on the school. Therefore, the need for tools in modelling in designing academic processes in schools, namely by using UML (Unified Modeling Language).

UML is a standard language used to model, design, and document software systems. The types of diagrams used in UML are Use Case Diagrams, Class Diagrams, Activity Diagrams, and Sequence Diagrams which can help in modeling the flow of new student admissions. The results of the literature review that has been carried out, it can be concluded that using UML in modeling in designing academic processes in schools has a positive impact and makes it easier to present better and more up-to-date information.

Keywords - Literature Review, UML, Information Systems, New Student Admissions

1. Introduction

In the current era of globalization, it is certainly very necessary to have fast and accurate information in presenting and running information for every educational institution which can certainly support and make it easier to achieve its goals [1]. Although the development of technology is now very fast, in some educational institutions there are still many lagging systems and many problems that occur such as those that still use manual systems or (forms). Therefore, a method is needed that can help these problems, namely the UML (Unified Modeling Language) method [2].

Unified Modeling Language or UML is a modeling tool in designing object-oriented software. Types of Unified Model Language (UML) Diagrams, namely use case diagrams serve to describe an interaction between one or more actors with the information system to be built, and can describe what functions exist in an information system, class diagrams are the main formation of object-oriented systems that present a class along with its attributes and operations, activity diagrams describe the workflow or activity of a system in the software [3]. Based on the previous explanation, the purpose of this research is to simplify the process of accepting new student flows and make these flows more efficient and effective, resulting in a positive impact on the process.

System Literature Review

A systematic literature review (SLR) is a type of library research method. Whatever the purpose, SLR emphasizes a research process that can be replicated by other researchers because it is clear and explains in detail the steps taken. SLR is an attempt to make the often-subjective study of literature more objective to reduce researcher bias [4]. Of course, the degree of objectivity can still be questioned because in literature research, the researcher also acts as a research instrument. The research process clearly means that SLR often takes longer than traditional literary research.

Although SLR emphasizes literature search methods, the analysis done on the data is not limited. Different types of analysis can be done, for example using statistics, which is often called meta-analysis. Conducting meta-analysis to manage data has its limitations, namely that processing can only be done based on the results of previous research involving statistical quantities. This means that qualitative research cannot be considered [5].

New Student Admission Information System

The admission process is the first step taken to receive education. This is an important event for a school, because this event is the starting point that determines the smooth running of school work. Errors in admitting new students can determine the success or failure of educational efforts at the school [6]. Accepting new students is not an easy thing. Schools must prepare the right strategy to do this, to be able to attract quality students whose input from the school can also be better so that the learning process can be maximized and the achievement of quality school capacity increases [7].

UML (Unified Modeling Language)

The Unified Modeling Language (UML) is a standard language used to model, design, and document software systems [8]. UML is used by professionals in software engineering, including systems analysts, designers, developers, and system maintainers.

UML provides several graphical notations used to describe various aspects of software systems, including system structure, system functions and behaviors, interactions between system components, as well as overall system architecture. UML also facilitates communication between stakeholders involved in system development [9].

2. Research Method

In this study, researchers used a descriptive method in which the data / papers that have been reviewed will be described qualitatively and will make precise and accurate descriptions [10].

The data that has been collected from various journals that are relevant with the research topic is then compiled in the form of a journal review. This problem identification process allows the determination of research objectives and outcomes to be achieved through the literature review. The main objective of this research is to investigate and analyze the performance of the new student admission information system using the UML method [11].

Research Question

This chapter is intended to find out about the methods used in the development of new student admission information systems. Therefore, the following questions have been adapted to this research, namely:

- a. RQ1: What UML diagrams are used in designing new student admission information systems?

b. RQ2: How can the UML method be used in research to design a new student admission information system?

Key Word Identification for Literature Search

The authors identified the keyword "Design of a New Student Admission Information System." Where these keywords are used in searches on Google Scholar, Research Gate, and Academia.edu.

Determination of Inclusion and Exclusion Criteria

In choosing an appropriate research title, here the authors need to determine the criteria for inclusion and exclusion related to the research discussed, including:

Inclusion:

- a. IC1. Research data obtained through Google Scholar, Research Gate, and Academia.edu.
- b. IC2. The time span of research published in 2016-2023
- c. IC3. The research focuses on the UML method in the design of a new student admission information system.

Exclusion:

- a. EC1. Research is not relevant to the context of the UML method in designing a new student admission system.
- b. EC2. Research does not cover the UML method in designing a new student admission system.

Setting Criteria for Quality Assessment

In ensuring the title of the results of the research search with the discussion on the research is suitable by providing certain criteria, including:

- a. QA1. Does the research have a good purpose?
- b. QA2. Is the research supported by relevant data and has validity?

3. Result and Analysis

a. RQ1. What UML diagrams are used in designing new student admission information systems?

Based on the results of the collection of papers that have been identified by the authors based on the application of applying the inclusion, exclusion, and quality assessment criteria, a total of 6 papers were selected that fit these criteria and could provide answers to predetermined research questions [12]. Table 1 shows what tools on UML diagrams are used in designing new student admission information systems originating from the 2016-2023 period.

Table 1. UML diagrams used in each paper

No	Diagram
1	Use Case Diagram
2	Class Diagram
3	Activity Diagram
4	Sequence Diagram

Quality Assessment Results

Table 2 shows the results of the assessment of data that can be used in this study

Table 2. Quality Assessment Results

No	Author	Journal Title	QA1	QA2	Results
1	Khilda Nistrina, dan Lisna Sahidah	Unified Modelling Language (UML) untuk Perancangan Sistem Informasi Penerimaan Siswa Baru di SMK MARGA INSAN KAMIL (Nistrina et al., 2022)	Y	Y	√
2	Sri Rahayu, dan Winda Suandi	Perancangan Sistem Informasi Penerimaan Siswa Baru Berbasis Web di Sekolah Menengah Atas Negeri 14 Garut menggunakan UML (Rahayu et al., 2017)	Y	Y	√
3	Nur Hayati, dan Lione	Perancangan Sistem Informasi Penerimaan Siswa Baru SMP Islam Izzatul Madani Bogor Berbasis Web menggunakan UML (Hayati et al., 2023)	Y	Y	√
4	Saipul Anwar, Yasin Efendi, Rushendra Rustam, dan Andrew	Perancangan Sistem Informasi Pendaftaran Mahasiswa Baru dan Pengisian KRS AMIK Wahana Mandiri Berbasis Web Mobile menggunakan UML (Anwar et al., 2016)	Y	Y	√
5	Fiqri Asyhari	Perancangan Sistem Informasi Penerimaan Siswa Baru di SD 104233 Bandar Labuhan Berbasis Web menggunakan UML (Asyhari 2022)	Y	Y	√
6	Abdul Mubarak	Rancang Bangun Aplikasi Web Sekolah Menggunakan UML dan Bahasa Pemograman PHP Berorientasi Objek (Mubarak 2019)	Y	Y	√

Description

Y	:	Yes (in accordance with QA)
N	:	No (not in accordance with QA)
√	:	Papers were selected because they contained information relevant to the data selection.
X	:	The papers that were not selected were due to irrelevance and lack of information on data selection.

b. RQ2. How can the UML method be used in research to design a new student admission information system?

From various studies that have been reviewed, using the UML method in designing new student admission information systems has a good / positive impact. We can take from one of the studies conducted by Nistrina, et al, who used the UML method in designing a new student admission information system. Where the results obtained are to produce a more efficient and effective process so that it can reduce the time required when managing data.

4. Conclusion

Based on the research that has been done, it can be concluded that in using the UML method on new student admission information systems that have been published in journals with a range of 2016 to 2023 they use 4 UML Diagrams, namely Use Case Diagrams, Class Diagrams, Activity Diagrams, and Sequence Diagrams. Through this method, it can allow the system to work more quickly, precisely, and accurately. Not only that, using the UML method can facilitate the presentation of better and updated information. This method is very helpful in simplifying the flow of the student admission system which still uses the old system.

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